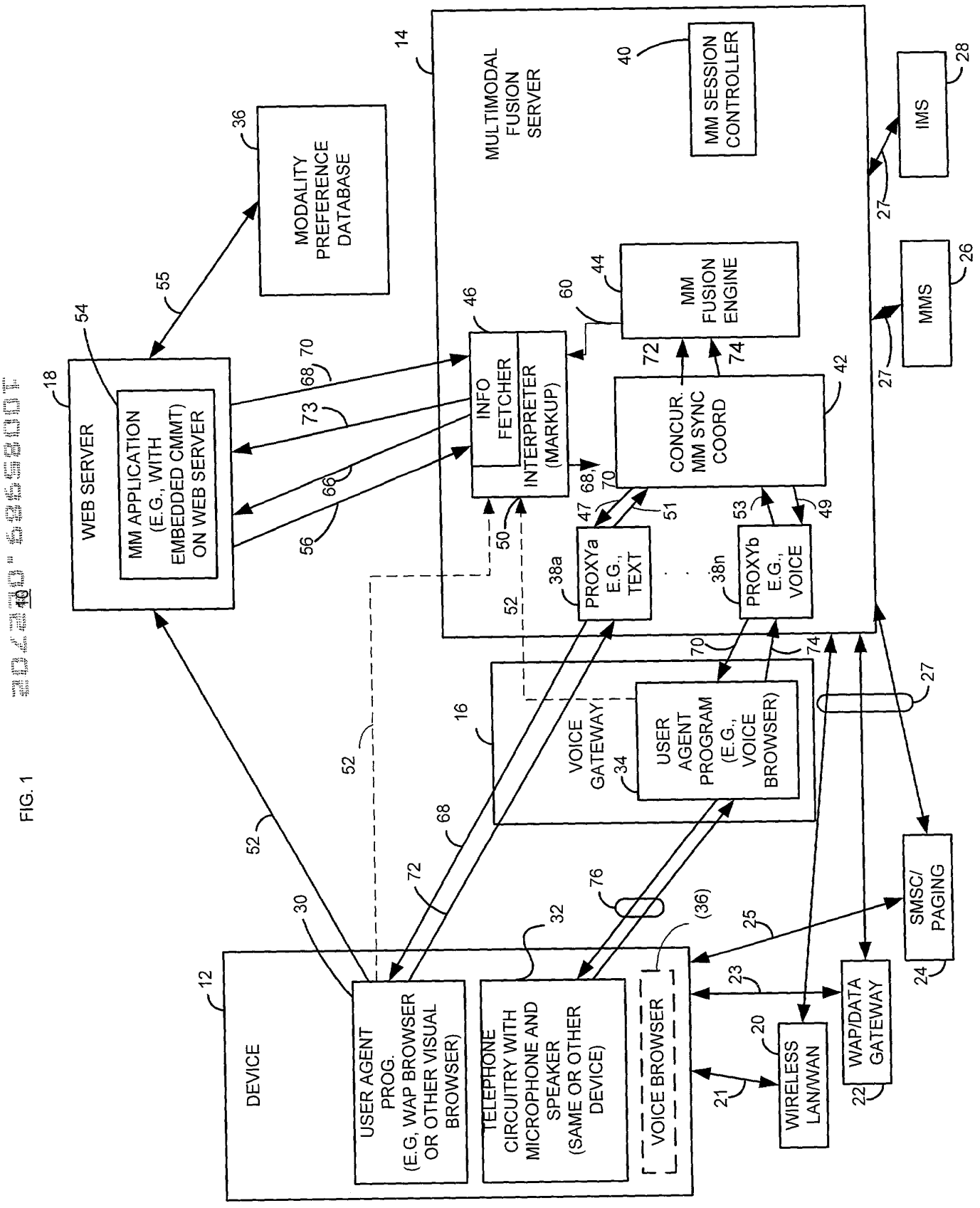

FIG. 1

10/078,360 - 02/19/2002

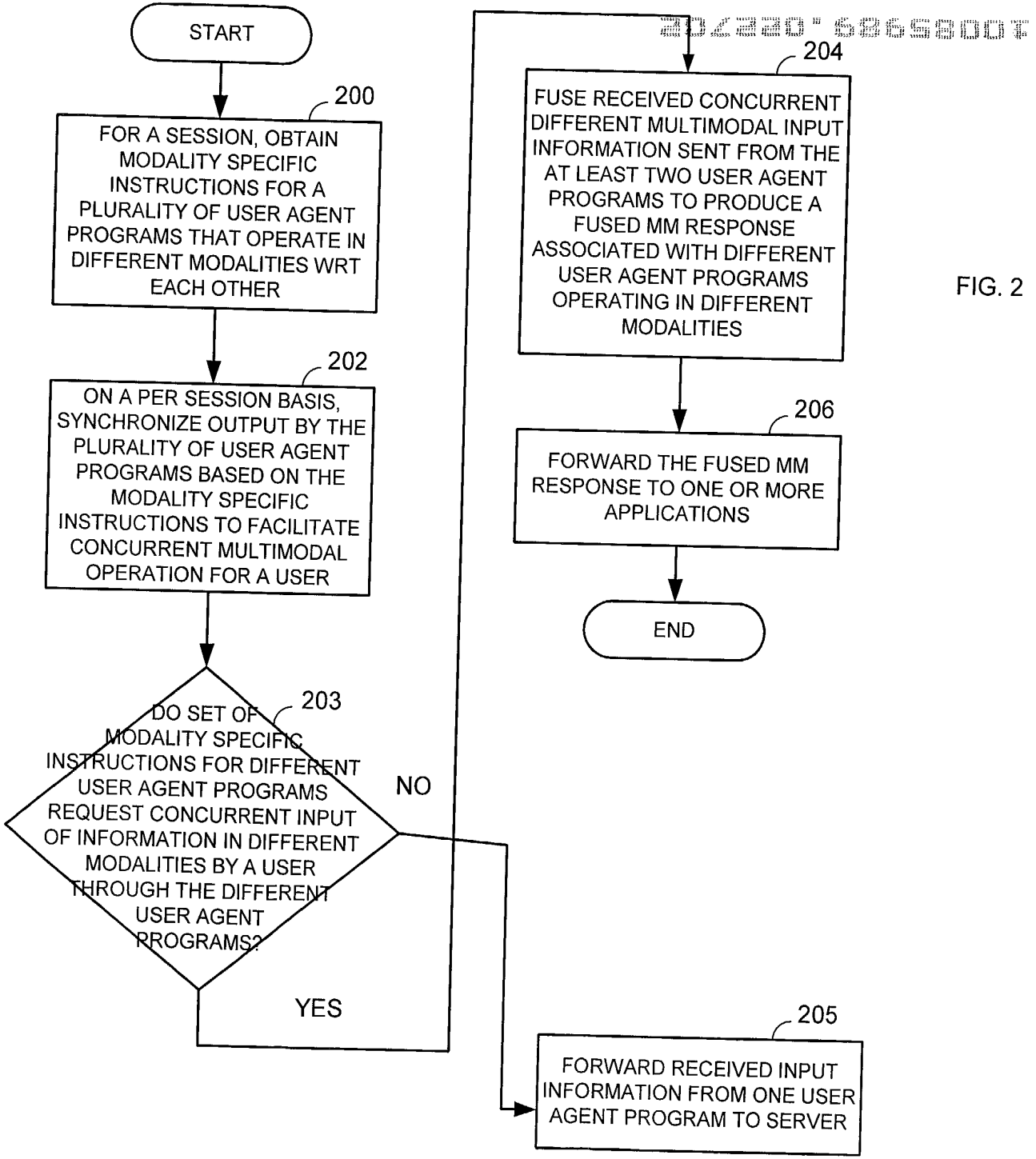
START
200
FOR A SESSION, OBTAIN MODALITY SPECIFIC INSTRUCTIONS FOR A PLURALITY OF USER AGENT PROGRAMS THAT OPERATE IN DIFFERENT MODALITIES WRT EACH OTHER
202
ON A PER SESSION BASIS, SYNCHRONIZE OUTPUT BY THE PLURALITY OF USER AGENT PROGRAMS BASED ON THE MODALITY SPECIFIC INSTRUCTIONS TO FACILITATE CONCURRENT MULTIMODAL OPERATION FOR A USER
203
DO SET OF MODALITY SPECIFIC INSTRUCTIONS FOR DIFFERENT USER AGENT PROGRAMS REQUEST CONCURRENT INPUT OF INFORMATION IN DIFFERENT MODALITIES BY A USER THROUGH THE DIFFERENT USER AGENT PROGRAMS?
NO
YES
204
FUSE RECEIVED CONCURRENT DIFFERENT MULTIMODAL INPUT INFORMATION SENT FROM THE AT LEAST TWO USER AGENT PROGRAMS TO PRODUCE A FUSED MM RESPONSE ASSOCIATED WITH DIFFERENT USER AGENT PROGRAMS OPERATING IN DIFFERENT MODALITIES
206
FORWARD THE FUSED MM RESPONSE TO ONE OR MORE APPLICATIONS
END
205
FORWARD RECEIVED INPUT INFORMATION FROM ONE USER AGENT PROGRAM TO SERVER

FIG. 2

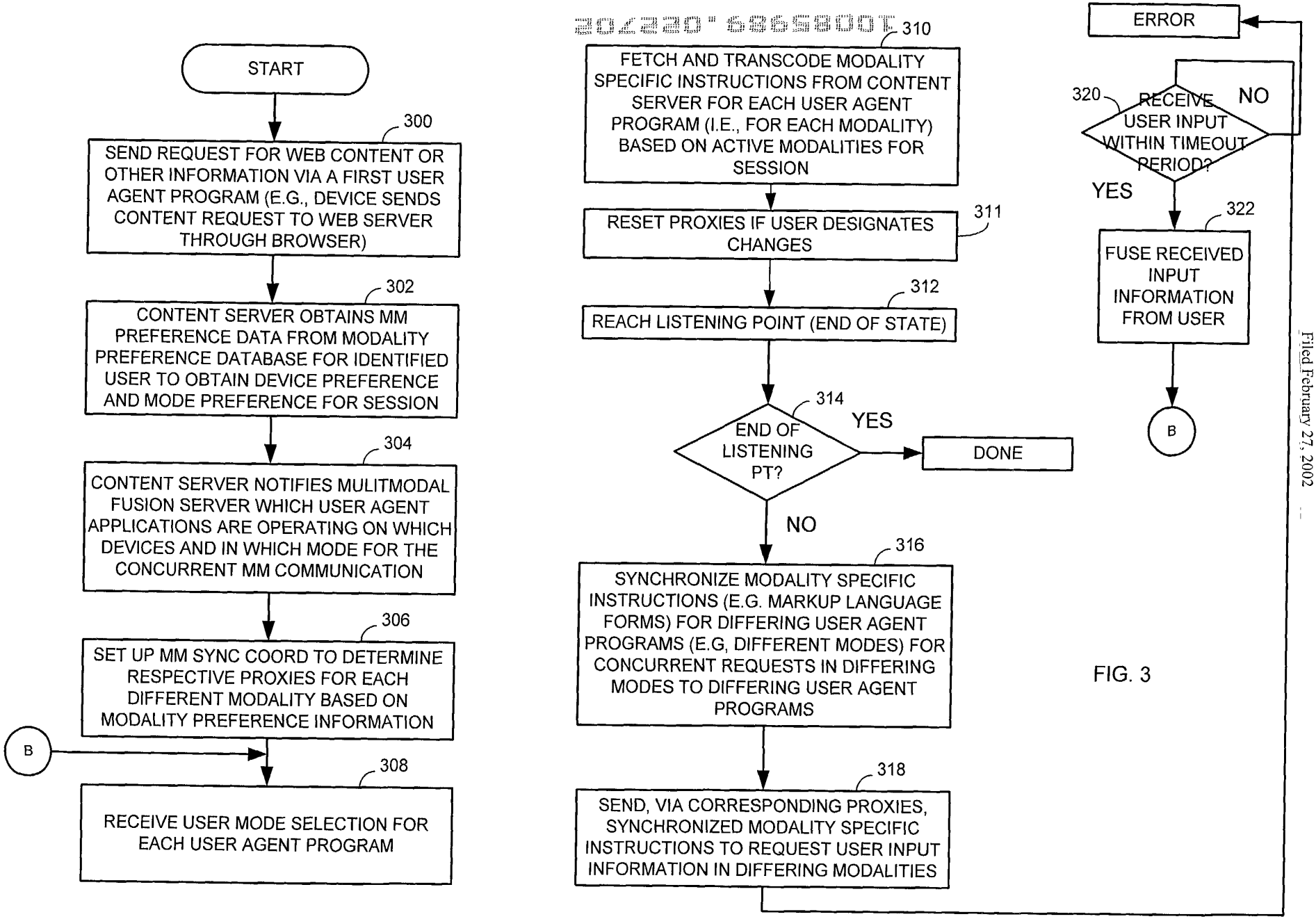
START
300
SEND REQUEST FOR WEB CONTENT OR OTHER INFORMATION VIA A FIRST USER AGENT PROGRAM (E.G., DEVICE SENDS CONTENT REQUEST TO WEB SERVER THROUGH BROWSER)
302
CONTENT SERVER OBTAINS MM PREFERENCE DATA FROM MODALITY PREFERENCE DATABASE FOR IDENTIFIED USER TO OBTAIN DEVICE PREFERENCE AND MODE PREFERENCE FOR SESSION
304
CONTENT SERVER NOTIFIES MULITMODAL FUSION SERVER WHICH USER AGENT APPLICATIONS ARE OPERATING ON WHICH DEVICES AND IN WHICH MODE FOR THE CONCURRENT MM COMMUNICATION
306
SET UP MM SYNC COORD TO DETERMINE RESPECTIVE PROXIES FOR EACH DIFFERENT MODALITY BASED ON MODALITY PREFERENCE INFORMATION
B
308
RECEIVE USER MODE SELECTION FOR EACH USER AGENT PROGRAM
310
FETCH AND TRANSCODE MODALITY SPECIFIC INSTRUCTIONS FROM CONTENT SERVER FOR EACH USER AGENT PROGRAM (I.E., FOR EACH MODALITY) BASED ON ACTIVE MODALITIES FOR SESSION
311
RESET PROXIES IF USER DESIGNATES CHANGES
312
REACH LISTENING POINT (END OF STATE)
314
END OF LISTENING PT?
YES
DONE
NO
316
SYNCHRONIZE MODALITY SPECIFIC INSTRUCTIONS (E.G. MARKUP LANGUAGE FORMS) FOR DIFFERING USER AGENT PROGRAMS (E.G, DIFFERENT MODES) FOR CONCURRENT REQUESTS IN DIFFERING MODES TO DIFFERING USER AGENT PROGRAMS
318
SEND, VIA CORRESPONDING PROXIES, SYNCHRONIZED MODALITY SPECIFIC INSTRUCTIONS TO REQUEST USER INPUT INFORMATION IN DIFFERING MODALITIES
ERROR
320
RECEIVE USER INPUT WITHIN TIMEOUT PERIOD?
NO
YES
322
FUSE RECEIVED INPUT INFORMATION FROM USER
B

FIG. 3

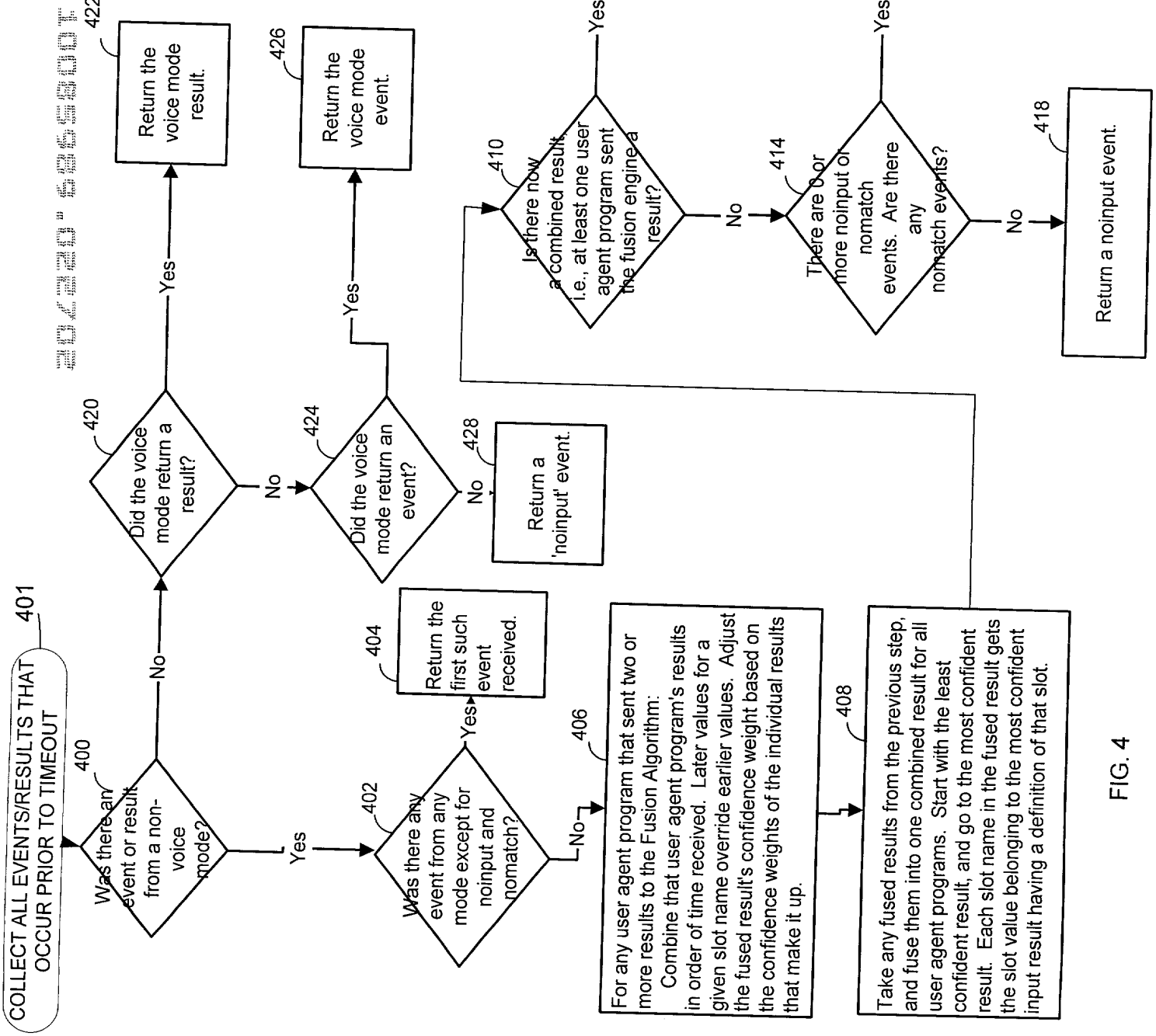
COLLECT ALL EVENTS/RESULTS THAT OCCUR PRIOR TO TIMEOUT
401
Was there an event or result from a non-voice mode?
400
No
Yes
Was there any event from any mode except for noinput and nomatch?
402
Yes
No
Return the first such event received.
404
Did the voice mode return a result?
420
No
Yes
Return the voice mode result.
422
Did the voice mode return an event?
424
No
Yes
Return a 'noinput' event.
428
Return the voice mode event.
426
For any user agent program that sent two or more results to the Fusion Algorithm:
Combine that user agent program's results in order of time received. Later values for a given slot name override earlier values. Adjust the fused result's confidence weight based on the confidence weights of the individual results that make it up.
406
Take any fused results from the previous step, and fuse them into one combined result for all user agent programs. Start with the least confident result, and go to the most confident result. Each slot name in the fused result gets the slot value belonging to the most confident input result having a definition of that slot.
408
Is there now a combined result, i.e., at least one user agent program sent the fusion engine a result?
410
No
Yes
Return the combined result.
412
There are 0 or more noinput or nomatch events. Are there any nomatch events?
414
No
Yes
Return a nomatch event.
416
Return a noinput event.
418

FIG. 4

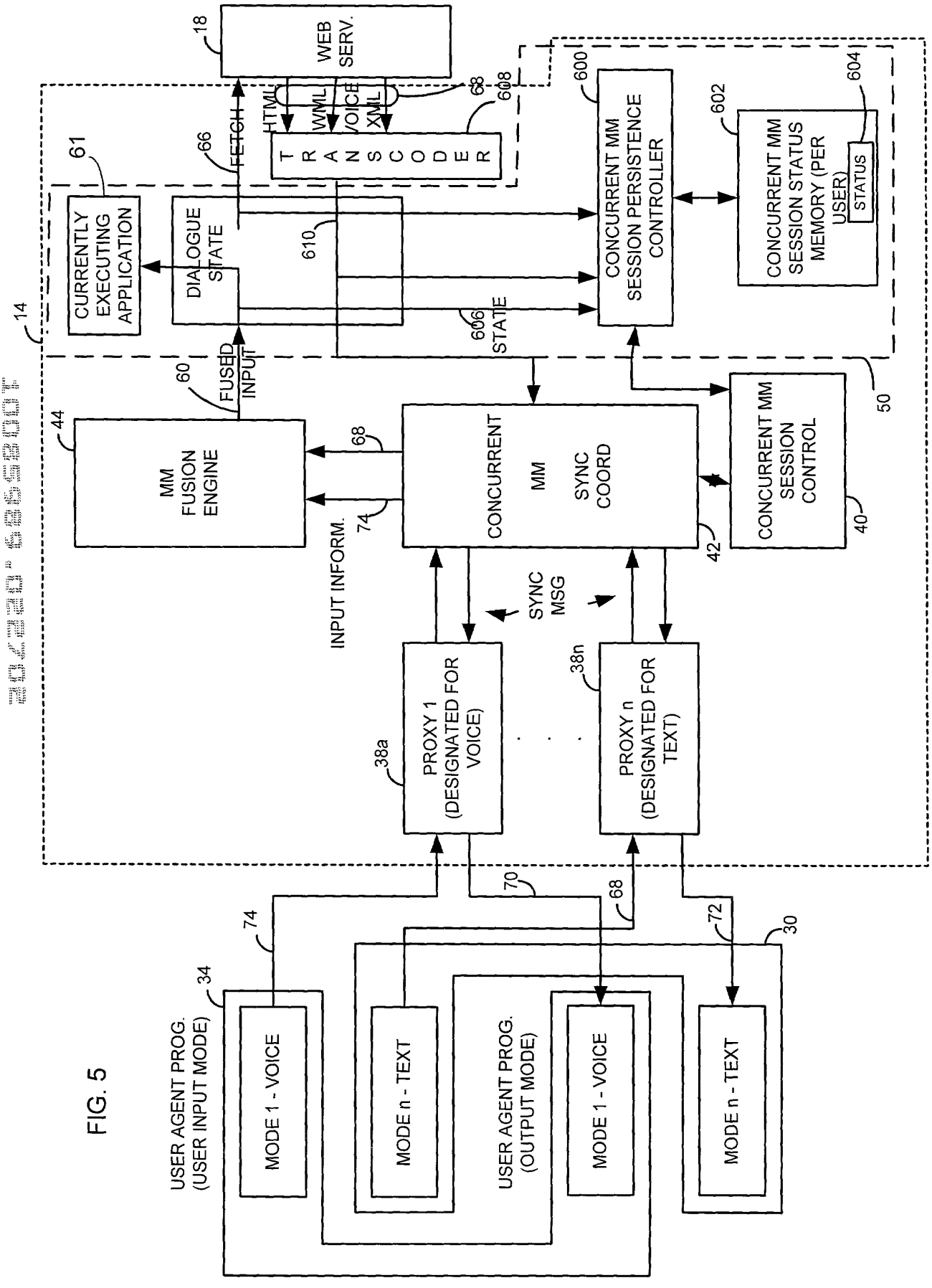
WEB SERV.
18
HTML
WML
VOICE XML
68
608
TRANSCODER
600
CONCURRENT MM SESSION PERSISTENCE CONTROLLER
602
CONCURRENT MM SESSION STATUS MEMORY (PER USER)
604
STATUS
FETCH
66
61
CURRENTLY EXECUTING APPLICATION
DIALOGUE STATE
610
606
STATE
14
FUSED INPUT
60
MM FUSION ENGINE
44
INPUT INFORM.
74
68
CONCURRENT MM SYNC COORD
42
CONCURRENT MM SESSION CONTROL
40
50
SYNC MSG
PROXY 1 (DESIGNATED FOR VOICE)
38a
PROXY n (DESIGNATED FOR TEXT)
38n
70
68
72
74
30
USER AGENT PROG. (USER INPUT MODE)
34
MODE 1 - VOICE
MODE n - TEXT
USER AGENT PROG. (OUTPUT MODE)
MODE 1 - VOICE
MODE n - TEXT

FIG. 5

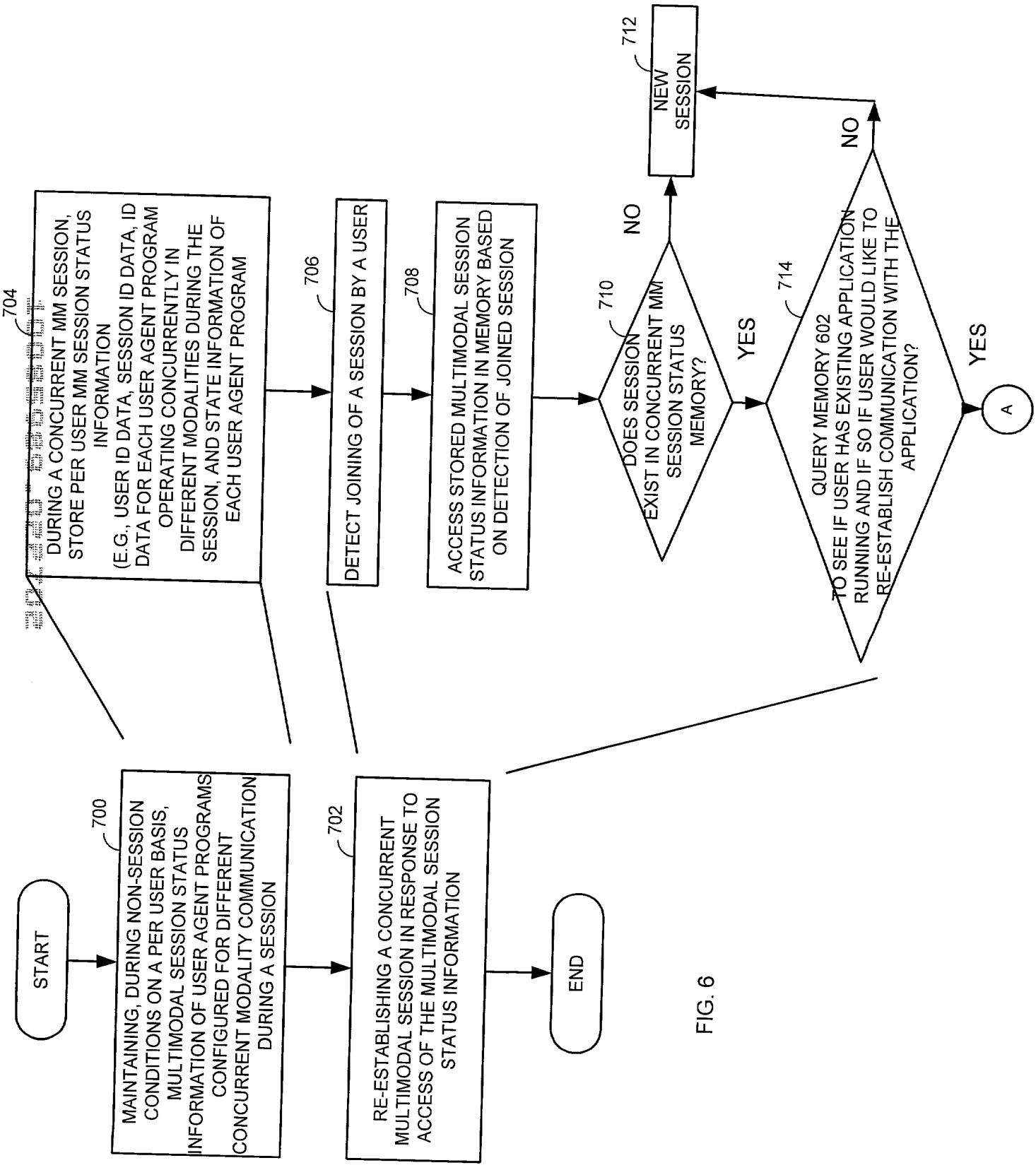
START
700
MAINTAINING, DURING NON-SESSION CONDITIONS ON A PER USER BASIS, MULTIMODAL SESSION STATUS INFORMATION OF USER AGENT PROGRAMS CONFIGURED FOR DIFFERENT CONCURRENT MODALITY COMMUNICATION DURING A SESSION
702
RE-ESTABLISHING A CONCURRENT MULTIMODAL SESSION IN RESPONSE TO ACCESS OF THE MULTIMODAL SESSION STATUS INFORMATION
END
704
DURING A CONCURRENT MM SESSION, STORE PER USER MM SESSION STATUS INFORMATION (E.G., USER ID DATA, SESSION ID DATA, ID DATA FOR EACH USER AGENT PROGRAM OPERATING CONCURRENTLY IN DIFFERENT MODALITIES DURING THE SESSION, AND STATE INFORMATION OF EACH USER AGENT PROGRAM
706
DETECT JOINING OF A SESSION BY A USER
708
ACCESS STORED MULTIMODAL SESSION STATUS INFORMATION IN MEMORY BASED ON DETECTION OF JOINED SESSION
710
DOES SESSION EXIST IN CONCURRENT MM SESSION STATUS MEMORY?
NO
YES
712
NEW SESSION
714
QUERY MEMORY 602 TO SEE IF USER HAS EXISTING APPLICATION RUNNING AND IF SO IF USER WOULD LIKE TO RE-ESTABLISH COMMUNICATION WITH THE APPLICATION?
NO
YES
A

FIG. 6

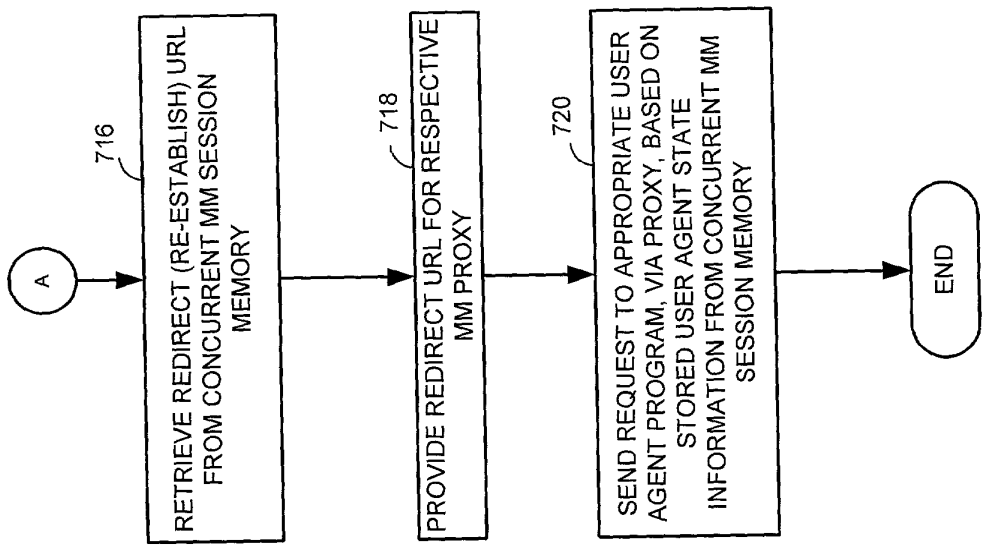
A
716
RETRIEVE REDIRECT (RE-ESTABLISH) URL FROM CONCURRENT MM SESSION MEMORY
718
PROVIDE REDIRECT URL FOR RESPECTIVE MM PROXY
720
SEND REQUEST TO APPROPRIATE USER AGENT PROGRAM, VIA PROXY, BASED ON STORED USER AGENT STATE INFORMATION FROM CONCURRENT MM SESSION MEMORY
END

FIG. 7

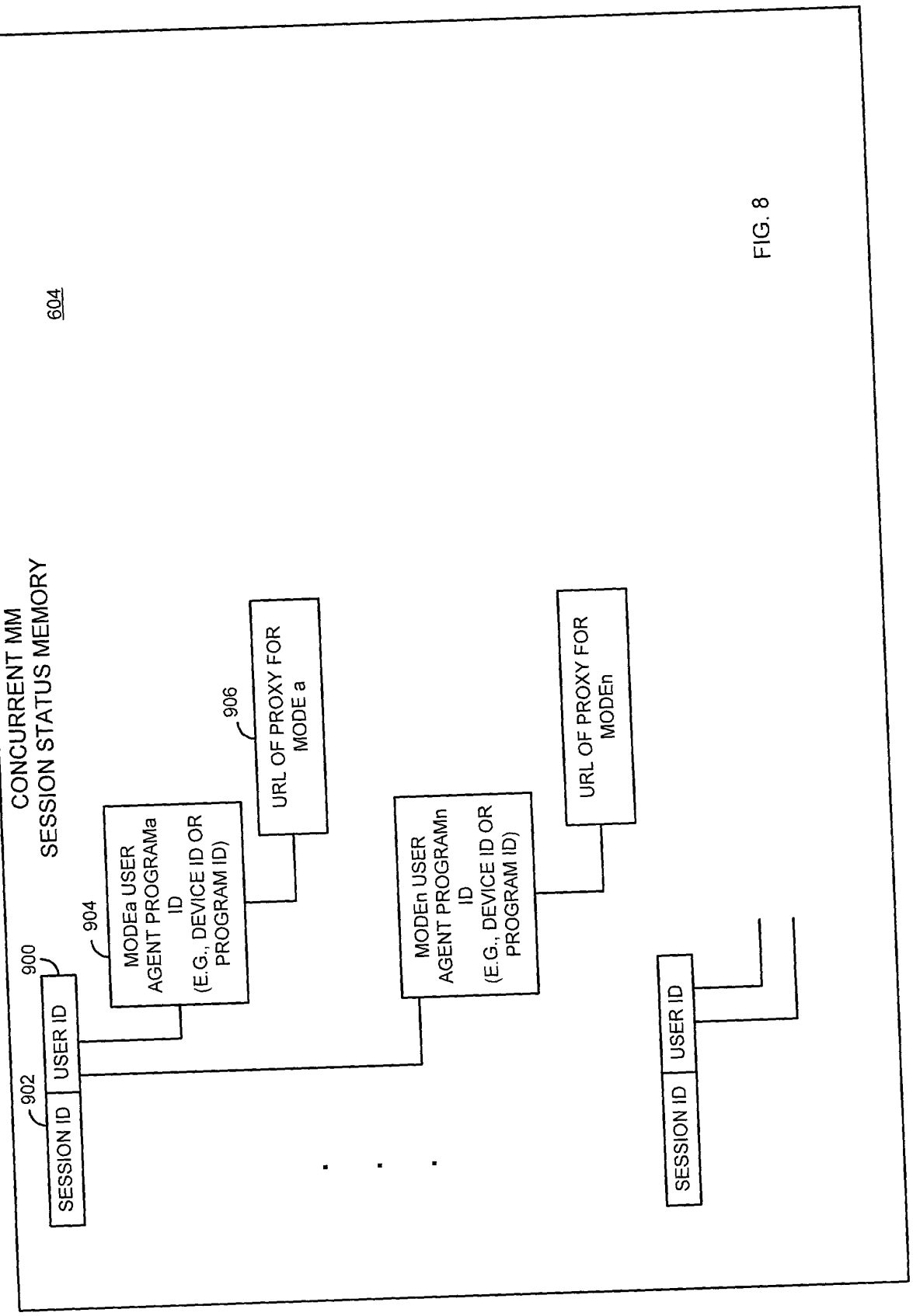
602
CONCURRENT MM
SESSION STATUS MEMORY
604
900
902
SESSION ID
USER ID
904
MODEa USER
AGENT PROGRAMa
ID
(E.G., DEVICE ID OR
PROGRAM ID)
906
URL OF PROXY FOR
MODE a
MODEn USER
AGENT PROGRAMn
ID
(E.G., DEVICE ID OR
PROGRAM ID)
URL OF PROXY FOR
MODEn
SESSION ID
USER ID

FIG. 8